

Effect of risk management strategy on NPD performance

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Abstract

New product development (NPD) is a major driver of firm growth and sustainable competitive advantage, yet risks are intrinsic in NPD in all industries. Thus understanding, identifying, managing, and reducing risk is of strategic importance for firms. In this research, we synthesize and build on previous research, and propose a three-dimensional risk management framework for NPD. We empirically test whether risk management strategy affects the performance of NPD using survey data from Chinese firms. The results show that risk management strategies targeted at specific risk factors, i.e., technological, organizational, and marketing, contribute both individually and interactively in affecting the performance of NPD. Appropriate risk management strategies can significantly improve the odds of NPD success.

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1. Introduction

Successful development and commercialization of new products (i.e., NPD) over time is essential to sustained competitive advantage of firms (e.g., Cooper and Kleinschmidt, 1995; Hartley, 2006). However, risks are intrinsic in NPD in all industries (e.g., Kwak and LaPlace, 2005). Thus firms need to take initiatives to reduce risks that are related with NPD. The risk–uncertainty–reduction hypothesis suggests that reducing risk and uncertainty is a primary motivation guiding firms' behavior (Bourgeois, 1984) and that increasing certainty by accumulating knowledge on how and on what to act “renders existence meaningful and confers confidence in how to behave and what to expect from the physical and social environment” (Hogg and Terry, 2000). This implies that effective risk management strategy would lead to increased firm NPD performance.

In the context of NPD, risk refers to the possibility that a newly developed product might fail due to various uncertain factors, i.e., market failure, technology constraints, and organizational hindering factors that lead to

insufficient sales for the product to survive and be profitable (Crawford and Di Benedetto, 2006). Nothing ventured, nothing gained, and firms must take risks to launch new products speedily and successfully. Firms thus require a strategy not simply of risk avoidance but risk management to successfully introduce new products to markets. Without proper risk assessment and risk management, projects can easily run out of control, consume significant additional resources, greatly inflate project costs and may lead to failure. Therefore, in NPD, the ability to develop, diagnose, and manage risks is increasingly considered to be of vital importance (Keizer et al., 2002).

Prior studies (e.g., Doering and Parayre, 2000) suggest adopting a comprehensive risk management framework that integrates the three most important risk factors that affect NPD performance: technology, marketing, and organization. However, this approach pays little attention to the process nature of risk and there is little empirical evidence on how risk management can improve NPD performance. We seek to address this research gap by explaining and empirically testing how risk management strategy affects NPD. We synthesize the literature on risk management in NPD (e.g., Doering and Parayre, 2000; Keizer et al., 2002), and propose a three-dimensional risk management framework for NPD.

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A key challenge faced by an NPD project is how to acquire knowledge and manage the sources of uncertainty in order to reduce the risk of failure of the project or resulting product (Cooper, 2003; Crawford and Di Benedetto, 2006). For example, studies have found that timely and reliable knowledge about customer preferences is among the most important areas of information necessary for product development (Holt, 1988). Therefore, we explore the issues under investigation from a knowledge-based theory of the firm (e.g., Kogut and Zander, 1996), i.e., how firms acquire, create, accumulate, and exploit risk management-related knowledge to reduce technological, marketing, and organizational risks in NPD. The more difficult the project in terms of its scope, technology, and complexity, the more susceptible an NPD project is to perturbations and mismatches in organization, marketing strategy, and external environment, and the greater its need is for knowledge acquisition, creation, and exploitation for the project to succeed (Cooper, 2003).

China is an ideal context for our empirical test. China has shifted its attention from a low-cost manufacturing advantage owing to low labor cost to developing technological expertise (Zhou and Leydesdorff, 2006). Little research, however, has been conducted in understanding how firms in emerging markets conduct NPD projects (e.g., Zhou and Leydesdorff, 2006). The complexity, turbulence, and dynamism of China's economic environment require that firms effectively mitigate risk to enhance NPD. More importantly, with the increasing share of China in the global economy, a focus on the NPD of China cannot only enhance our understanding of the NPD strategy of Chinese firms, but also can help firms world-wide learn how to exploit the world's largest untapped market and highest growth potential. It has become clear that businesses wanting to succeed globally will need to win in China first (Gadiesh et al., 2007). Thus, there is an urgent practical need to shed further light on NPD practices in this major emerging market (Lin and Germain, 2003).

2. Theory and hypotheses

In recent years, intensified international competition, diverse and rapidly changing technologies, and demanding and heterogeneous customer expectations have made the innovation process more complex and the outcome of innovation much less certain than before (Ogawa and Piller, 2006). Researchers have attempted to work out solutions to managing risk and have proposed that risk management usually takes three stages: occurrence, impact, and control (Halman and Keizer, 1994). This implies that, in the case of NPD, managers need to (1) identify and control the risk factors within the time and resource limits of the project, (2) take actions to reduce the likelihood of a bad outcome, and (3) minimize adverse impact.

However, how to categorize and analyze NPD risks in a parsimonious model is a challenging task. Categorizing risk helps to diagnose the possibly consequential relationships

between the phenomenon and the outcomes of interest, and to help structure the risks based on their causes and levels of predictability. Doering and Parayre (2000) suggested three kinds of risks associated with NPD: technological risk, marketing risk, and organizational risk. In a case study, Keizer et al. (2002) developed a risk management diagnostic method for how to manage technological, organizational, and business risk.

NPD is a process in which ideas or technologies are materialized, managed, and finally moved to market. Technology, organization, and marketing are the three most indispensable NPD process components. Success of product innovation is determined by both external influences and internal circumstances in which these factors interact. Technology is the carrier of new ideas, organization is the delivery process for the ideas, and market is where the technology meets the customers. Consistent with previous studies (e.g., Doering and Parayre, 2000; Keizer et al., 2002), we analyze NPD risks using this three dimensional framework. The framework emphasizes that firms can identify, analyze, respond to, and monitor the major risks in NPD process by various means such as learning from customers and other entities (Carayannis, 1999), sourcing external knowledge, and integrating specialized knowledge internally. Our research framework is illustrated by Fig. 1.

2.1. Technological risk and management

Perceived technological risk refers to a firm's inability to completely understand or accurately predict some aspects of technological environment as it relates to NPD projects (e.g., Milliken, 1987). Technological risk is either endogenous or exogenous to the firm and can arise from two major sources. First, *predictability*; i.e., firms cannot predict accurately whether the new innovation can function as it promises. Because of technology cycles, no one can accurately forecast how long a new product will survive, and technological obsolescence may kill a new product or process almost as soon as it has been launched (Freeman and Soete, 1997). Second, *capability*; i.e., it is often unclear whether firms have adequate NPD capability to successfully launch a new product or can provide prompt and effective after-sales service. Capabilities of a fledgling technology or product are often poorly understood and a dominant design for a new product can take years to emerge (Christensen and Bower, 1996). Potential users are uncertain whether the technical standard embodied in the new product will dominate in the future. Also, firms cannot accurately predict the unexpected side-effects of the new product (e.g., the possibility of unintended physical harm resulting from product use). These technological risks pose a serious challenge to NPD success.

There are various means firms might mitigate technological risk. For example, having a technology orientation can help firms acquire new technologies, and apply advanced technology to firms' product development and

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